

REMARKS

Reconsideration and allowance of the above-identified Application in view of the above amendments and the following remarks are respectfully requested.

Claims 1-5, 7-14, and 16-21 are pending in the Application. Claims 6 and 15 have been cancelled herein without prejudice or disclaimer to the subject matter recited therein and claims 1, 4, 7-9, 11-14, and 16-21 have been amended.

Claim rejections – 35 USC § 112

Claim 18 was rejected. Claim 18 has been amended to read “said instructions are” which has antecedent in claim 13. Therefore, Applicants respectfully request that the rejection of claim 18 be withdrawn.

Claim rejections – 35 USC § 102

Claims 1, 4-21 were rejected under 35 U.S.C. § 102(a) over European Patent Application EP 1 251 402 (hereinafter EP ‘402). Applicants respectfully traverse this rejection for at least the following reasons.

Claims 6 and 15 have been cancelled herein without prejudice or disclaimer to the subject matter recited therein. Therefore, the rejection of claims 6 and 15 is rendered moot.

Claim 1 has been amended to recite, *inter-alia*, “controlling system aberrations in the projection system used in said projecting to compensate for mask-induced imaging artifacts, so that values of at least one imaging metric for different feature types appearing in said pattern are brought closer together.”

EP ‘402 discloses a method in which a calculation is performed to determine a compensation to apply a lithographic apparatus in order to minimize an error in an image of mask pattern projected using a projection system in the lithographic apparatus. The compensation includes introducing one component of aberration of the lithographic apparatus in order to decrease the effect of another aberration, such that, on balance, the image quality as a whole is improved. However, EP ‘402 is silent about controlling aberrations in the projection system to compensate for mask-induced imaging artifacts so that values of at least one imaging metric for different feature types in the mask pattern are brought closer together.

For example, in an embodiment of the present invention, one imaging metric can be a best focus shift, isofocal tilt, critical dimension, critical dimension uniformity, overlay,

telecentricity, pattern asymmetry, pitch linearity and/or iso-dense bias. By controlling aberrations in the projection system, values of best focus shift, isofocal tilt, critical dimension, critical dimension uniformity, overlay, telecentricity, pattern asymmetry, pitch linearity and/or iso-dense bias for different feature types having, for example different densities, different orientation and/or different critical dimension, can be brought together. As a result, artifacts in the resulting patterned images can be reduced or substantially eliminated.

Furthermore, contrary to the Examiner's contention, EP '402 does not disclose, teach or suggest, *inter-alia*, "a computer readable medium having executable instructions stored therein, when executed on a computer system, instruct the computer to perform a method comprising ...determining the optimum combination of aberrations using the determined sensitivities so that values of at least one imaging metric for different features in the mask pattern are brought closer together," as recited in claim 13 (emphasis added).

Moreover, contrary to the Examiner's contention, EP '402 does not disclose, teach or suggest, *inter-alia*, "wherein said optimizing includes bringing values of at least one imaging metric for different feature types in the mask pattern closer together," as recited in claim 20.

Therefore, Applicants respectfully submit that claims 1, 13 and 20, and claims 4, 5, 7-12, 14, 16-19 and 21 which depend from claim 1, claim 13 or claim 20, are patentable. Thus, Applicants respectfully request that the rejection of claims 1, 4-21 under § 102(a) over EP '402 be withdrawn.

Claims 13-16 were rejected under 35 U.S.C. 102(e) over Bendik et al. (U.S. Patent No. 6,673,638). Applicants respectfully traverse this rejection for at least the following reasons.

Claim 15 has been cancelled herein without prejudice or disclaimer to the subject matter recited therein. Therefore, the rejection of claim 15 under 102(e) over Bendik et al. is rendered moot.

Bendik et al. discloses a method for controlling the variation in process parameters using test structures sensitized to process parameter changes. Figure 1 in Bendik et al. merely shows a diagrammatic representation of the use of wavefront engineering techniques in the form of binary changes of the reticle pattern. Figure 9 in Bendik et al. merely shows a wafer or reticle inspection system (including a computer system). Contrary to the Examiner's contention, the computer system in Bendik et al. does not perform the steps as recited in claim 13.

Clearly, Bendik et al. does not disclose, teach or suggest, *inter-alia*, “a computer readable medium having executable instructions stored therein, when executed on a computer system, instruct the computer to perform a method comprising ...determining the optimum combination of aberrations using the determined sensitivities so that values of at least one imaging metric for different features in the mask pattern are brought closer together,” as recited in claim 13.

Therefore, Applicants respectfully submit that claim 13, and claims 14 and 16 which depend from claim 13, are patentable. Thus, Applicants respectfully request that the rejection of claims 13-16 under 102(e) over Bendik et al. be withdrawn.

Claim rejections – 35 USC § 103

Claims 2 and 3 were rejected under 35 U.S.C. § 103(a) as being unpatentable over EP ‘402 in view of either Han et al. (U.S. Patent Application Publication No. 2004/0091789) or the article entitled “Asymmetric Properties of the Aerial Image in Extreme Ultraviolet Lithography” by Otaki. Applicants respectfully traverse this rejection for at least the following reasons.

Claims 2 and 3 depend directly from claim 1. Therefore, for at least the reasons provided above with respect to claim 1, Applicants respectfully submit that claims 2 and 3 are patentable.

Han et al. and Otaki fail to cure the deficiencies noted above in EP ‘402. Han et al. merely discloses a reflective EUV mask. Similarly Otaki merely discloses a reflective EUV mask. Neither Han et al. nor Otaki disclose, teach or suggest, *inter-alia*, “a device manufacturing method comprising:... controlling system aberrations in the projection system used in said projecting to compensate for mask-induced imaging artifacts, so that values of at least one imaging metric for different feature types appearing in said pattern are brought closer together,” as recited in claim 1. Consequently, none of EP ‘402, Han et al. and Otaki, alone or in combination, disclose, teach or suggest the subject matter recited in claim 1.

Therefore, Applicants respectfully submit that claims 2 and 3 which depend from claim 1 are patentable and respectfully request that the rejection of claims 2 and 3 under § 103(a) over the combination of EP ‘402 and Han et al. or Otaki be withdrawn.

CONCLUSION

In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

PILLSBURY WINTHROP SHAW PITTMAN LLP



ROBERT C. PEREZ
Reg. No. 39328
Tel. No. 703-905-2159
Fax No. 703-905-2500

Date: August 10, 2005

P.O. Box 10500
McLean, VA 22102
(703) 905-2000

RCP/KG